

FIG. 1A

**KCNQ5 cDNA coding sequence**

atgaaggatg tggagtcggg ccggggcagg gtgctgctga 40  
actcggcagc cgccaggggc gacggcctgc tactgctggg 80  
caccgcgcgc gccacgcttg gtggcggcgg cggcggcctg 120  
agggagagcc gccggggcaa gcagggggcc cggatgagcc 160  
tgctggggaa gccgctctct tacacgagta gccagagctg 200  
ccggcgcaac gtcaagtacc ggccgggtgca gaactacctg 240  
tacaacgtgc tggagagacc ccgcggctgg gcgttcacct 280  
accacgcttt cgtttttctc cttgtctttg gttgcttgat 320  
tttgtcagtg ttttctacca tccctgagca cacaaaattg 360  
gcctcaagtt gcctcttgat cctggagttc gtgatgattg 400  
tcgtcttttg tttggagttc atcattcgaa tctggctctgc 440  
gggttgctgt tgctgatata gaggatggca aggaagactg 480  
aggtttgctc gaaagccctt ctgtgttata gataccattg 520  
ttcttatcgc ttcaatagca gttgtttctg caaaaactca 560  
gggtaatat tttgccacgt ctgcactcag aagtctccgt 600  
ttcctacaga tcctccgcac ggtgcgcacg gaccgaaggg 640  
gaggcacttg gaaattactg ggttcagtgg tttatgctca 680  
cagcaaggaa ttaatcacag cttggtacat aggatttttg 720  
gttcttattt tttcgtcttt ccttgtctat ctggtggaaa 760

FIG. 1B

aggatgccaa	taaagagttt	tctacatatg	cagatgctct	800
ctggtggggc	acaattacat	tgacaactat	tggctatgga	840
gacaaaactc	ccctaacttg	gctgggaaga	ttgctttctg	880
caggctttgc	actccttggc	atttctttct	ttgcacttcc	920
tgccggcatt	cttggtcag	gttttgcatt	aaaagtacaa	960
gaacaacacc	gccagaaaca	ctttgagaaa	agaaggaacc	1000
cagctgccaa	cctcattcag	tgtgtttggc	gtagttacgc	1040
agctgatgag	aaatctgttt	ccattgcaac	ctggaagcca	1080
catttgaagg	ccttgcacac	ctgcagccct	accaagaaag	1120
aacaagggga	agcatcaagc	agtcagaagc	taagttttaa	1160
ggagcgagtg	cgcatggcta	gccccagggg	ccagagtatt	1200
aagagccgac	aagcctcagt	aggtgacagg	aggtccccaa	1240
gcaccgacat	cacagccgag	ggcagtccca	ccaaagtgca	1280
gaagagctgg	agcttcaacg	accgaaccgg	cttccggccc	1320
tcgctgcgcc	tcaaaagttc	tcagccaaaa	ccagtgatag	1360
atgctgacac	agcccttggc	actgatgatg	tatatgatga	1400
aaaaggatgc	cagtgtgatg	tatcagtgga	agacctcacc	1440
ccaccactta	aaactgtcat	tcgagctatc	agaattatga	1480
aatttcatgt	tgcaaaacgg	aagtttaagg	aaacgttacg	1520
tccatatgat	gtaaaagatg	tcattgaaca	atattctgct	1560

FIG. 1C

ggatcatctgg acatgtttgtg tagaattaaa agccttcaaa 1600  
cacgtgttga tcaaattctt ggaaaagggc aaatcacatc 1640  
agataagaag agccgagaga aaataacagc agaacatgag 1680  
accacagacg atctcagtat gctcggtcgg gtgggtcaagg 1720  
ttgaaaaaca ggtacagtcc atagagtcca agctggactg 1760  
cctactagac atctatcaac aggtccttcg gaaaggctct 1800  
gcctcagccc tcgctttggc ttcattccag atcccacctt 1840  
ttgaatgtga acagacatct gactatcaaa gccctgtgga 1880  
tagcaaagat ctttcggggt cgcacaaaa cagtggctgc 1920  
ttatccagat caactagtgc caacatctcg agaggcctgc 1960  
agttcattct gacgccaaat gagttcagtgc cccagacttt 2000  
ctacgcgctt agccctacta tgcacagtca agcaacacag 2040  
gtgccaatta gtcaaagcga tggctcagca gtggcagcca 2080  
ccaacaccat tgcaaaccaa ataaatacgg cacccaagcc 2120  
agcagcccca acaactttac agatcccacc tcctctccca 2160  
gccatcaagc atctgcccag gccagaaact ctgcacccta 2200  
accctgcagg cttacaggaa agcatttctg acgtcaccac 2240  
ctgccttggt gcctccaagg aaaatgttca ggttgcacag 2280  
tcaaattctca ccaaggaccg ttctatgagg aaaagctttg 2320  
acatggggagg agaaactctg ttgtctgtct gtcccatggg 2360  
gccgaaggac ttgggcaaact ctttgtctgt gcaaaacctg 2400  
atcaggtcga ccgaggaact gaatatataa ctttcaggga 2440

## FIG. 1D

gtgagtcaag tggctccaga ggcagccaag atttttaccc 2480  
caaatggagg gaatccaaat tgtttataac tgatgaagag 2520  
gtgggtcccc aagagacaga gacagacact tttgatgccg 2560  
caccgcagcc tgccagggaa gctgcctttg catcagactc 2600  
tctaaggact ggaagggtcac gatcatctca gagcatttgt 2640  
aaggcaggag aaagtacaga tgccctcagc ttgcctcatg 2680  
tcaaactgaa ataa 2694

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FIG. 2A

KCNQ5 Protein Sequence

MKDVESGRGR	VLLNSAAARG	DGLLLLGTRA	ATLGGGGGGL	40
RESRRGKQGA	RMSLLGKPLS	YTSSQSCRRN	VKYRRVQNYL	80
YNVLERPRGW	AFIYHAFVFL	LVFGCLILSV	FSTIPEHTKL	120
ASSCLLILEF	VMIVVFGLEF	IIRIWSAGCC	CRYRGWQGRL	160
RFARKPFCVI	DTIVLIASIA	VVSAKTQGNI	FATSALRSLR	200
FLQILRMVRM	DRRGGTWKLL	GSVVYAHSKE	LITAWYIGFL	240
VLIFSSFLVY	LVEKDANKEF	STYADALWWG	TITLTTIGYG	280
DKTPLTWLGR	LLSAGFALLG	ISFFALPAGI	LGSGFALKVQ	320
EQHRQKHFEK	RRNPAANLIQ	CVWRSYAADE	KSVSIATWKP	360
HLKALHTCSP	TKKEQGEASS	SQKLSFKERV	RMASPRGQSI	400
KSRQASVGDR	RSPSTDITAE	GSPTKVQKSW	SFNDRTRFRP	440
SLRLKSSQPK	PVIDADTALG	TDDVYDEKGC	QCDVSVEDLT	480
PPLKTVIRAI	RIMKFHVAKR	KFKETLRPYD	VKDVIEQYSA	520
GHLDMLCRIK	SLQTRVDQIL	GKGQITSDKK	SREKITAEHE	560
TTDDL SMLGR	VVKVEKQVQS	IESKLDCLLD	IYQQVLRKGS	600
ASALALASFQ	IPPFECEQTS	DYQSPVDSKD	LSGSAQN SGC	640
LSRSTSANIS	RGLQFILTPN	EFSAQTFYAL	SPTMHSQATQ	680
VPISQSDGSA	VAATNTIANQ	INTAPKPAAP	TTLQIPPPLP	720
AIKHLPRPET	LHPNPAGLQE	SISDVTTCLV	ASKENVQVAQ	760
SNLTKDRSMR	KSFDMGGETL	LSVCPMVPKD	LGKSLSVQNL	800
IRSTEELNIQ	LSGSESSGSR	GSQDFYPKWR	ESKLFITDEE	840

## FIG. 2B

VGPEETETDT FDAAPQPARE AAFASDSLRT GRSRSSQSIC	880
KAGESTDALS LPHVKLK	897

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FIG. 3

**Alternative Splice Exon 1**

TGG	GGA	CAG	TGG	ACA	TTG	CGT
Trp	Gly	Gln	Trp	Thr	Leu	Arg

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## FIG. 4A

### 3' UTR

gttccttcatt	ttctttccag	gcatagcagt	tcttttagcca	40
tacatatcat	tgcatgaact	atttcgaaag	cccttctaaa	80
aagttgaaat	tgcaagaatc	gggaagaaca	tgaaaggcag	120
tttataagcc	cgttaccttt	taattgcatg	aaaatgcatg	160
tttagggatg	gctaaaattc	caaggtgcat	cgacattaac	200
ccactcattt	agtaatgtac	cttgagttaa	aaagcctgag	240
aaaccaaaca	cagctaatgc	tatggggtgt	atgaatatgt	280
caagtttagg	tcatttagaa	gatttgacac	tgtattttga	320
aattatgagt	aaacaccttc	aaatttcagg	catttctgct	360
ttgtgactaa	atacaaacta	cattttcaag	attaggccat	400
aatgtatatt	taaacacaat	ggctatcaac	agctgctaata	440
aaggtatcaa	ctaaagcaga	attggggaat	aatagaaatg	480
gctgcttatt	tcaagatata	tttgccaacc	cattcctatt	520
cagtcatttt	attattaatg	taatttgaat	gtcaatttgt	560
gtgcttttgg	tgatttagcg	ctgtggcaag	caattttgca	600
catcattttc	atgttgttct	ttatgacaag	aatgttcttc	640
aattagaaaa	tgtgcaaata	atgaaattca	gggccagtga	680
ggcaaataga	ctatctgaca	tatttgactt	tatgaaaaca	720
tattgcctga	tggcagaatc	aactttataa	gtggtcaact	760
tctacacaag	cgtatgaaat	actggtcagt	agaacagcca	800



## FIG. 4B

ttgtgattgg actggtttct ctgcaatggc gccaacccca	840
ggcttgccaa tactgcctat gtaaagggca agtgtgagaa	880
gctattctca tttcgctgac atacaggtag gactatgggg	920
gatgggacat ttgagtggga ctgagatagg aaaggcttga	960
aaagaaccca gaaacaccac caggaagttg gcaaagtaaa	1000
agaaaatgac ttccccctca aagggaatg agagggagag	1040
aaacaaacca aaatagaaga actagacttt ttagaaaatg	1080
agtattgcta	1090

FIG. 5A

Multiple Sequence Alignment of the KCNQ Channel Family Members

```

hskcnq4 ~~~~~~MAEAPPRRLGLGPPPGDAPRAE.LVALTAVQSEQGEAG.
hskcnq5 ~~~~~~MKDVESGR.GRVLLNSAAARGDLLLLGTRAATLGGGG.
hskcnq2 ~~~~~~MVQKSRNG.GVYPG..PSGEKKLVGFVGLDPG.AP.
hskcnq3 MGLKARRAAGAAGGGGDGGGGGGGAANPAGGDAAGDEERKVGLAPGDVEQVTIALGA.
hskcnq1 ~~~~~~MAAASSPPRAERKRWGWGRLPGARRGSAGLAKKCPFSLELAEGGP

hskcnq4 GGGSPRRRLGLLGSPLP.PGAPLPGPGSG.SGSACGORSSAA.HKR...Y..RR.....
hskcnq5 GGLRESRRGKQCARMSLLGKPL...SYT.SSQSC.RR.....NVK...Y..RR.....
hskcnq2 DSTRDGALLIAGSEAPKRGSI LSKPRAG.GAGA..GKPPKR.NAF...Y..RK.....
hskcnq3 GADKDGTL LLEGGGRDE.GQRRT PQIGILLAKTPLSRPVKRNNAK...Y..RR.....
hskcnq1 AGGALYAPIAPGAPGPAPPASPAAPAAPPVASDLGPPPPVSLDPRVSIYSTRRPV LARTH

hskcnq4 LQNWVYNVLERPRGW.AFYVYHVFLLVFSCLVLSVLSTIQEHQELANECLLILEFVMIV
hskcnq5 VQNYLYNVLERPRGW.AFTYHAFVFLVFGCLILSVFSTIPEHTKLASSCLLILEFVMIV
hskcnq2 LQNFLYNVLERPRGW.AFTYHAYVFLVFSCLVLSVFSTIKEYEKSSEGALYILEIVTIV
hskcnq3 IOTLIYDALERPRGW.ALLYHALVFLIVLGLCLILAVLITTFKEYETVSGDWLLLIETFAIF
hskcnq1 VOGRVYNFLERPTGWKCFVYHFVFLIVLVCLIFSVLSTIEQYAALATGTLFWMEIVLIV

hskcnq4 VFGLEYIVRVWSAGCCCRYRCWQGRFRFARKEFCVIDFIVFVASVAITAAGTQGNIFATS
hskcnq5 VFGLEFIIRVWSAGCCCRYRCWQGR LRFARKEFCVIDTIVLIASIAVVS AKTQGNIFATS
hskcnq2 VFGVEYFVRVWAAGCCCRYRCWGR LKRFARKEFCVIDIMVL IASIAVLAAGSQGNVFATS
hskcnq3 IFGAEEHALRVWAAGCCCRYKWRGR LKRFARKEFCVIDI FVL IASVPVWAVGNQGNVLATS
hskcnq1 FFGTEYVVRVWSAGCRSKYVCLWGRLRFARKEFISIDLI VVVASMVVLCVGSKGQVFATS

hskcnq4 ALRSMRFLQILRMVRMDRRGGTWKLLGSVVYAH SKELITAWYIGFLVLIFASELIVYLAEK
hskcnq5 ALRSLRFLQILRMVRMDRRGGTWKLLGSVVYAH SKELITAWYIGFLVLIFSSFLVYLVEK
hskcnq2 ALRSLRFLQILRMVRMDRRGGTWKLLGSVVYAH SKELITAWYIGFLCLILASELIVYLAEK
hskcnq3 .LRSLRFLQILRMVRMDRRGGTWKLLGSATCAH SKELITAWYIGFLTLILSSFLVYLVEK
hskcnq1 ALRGIRFLQILRMVRMDRRGGTWKLLGSVVVFIHROELITTLYIGFLGLIFSSYFVYLAEK

hskcnq4 DA.....NSDFSSYADSLWWGTITLTITIGYGDKTPHTWLGRLAAGFALLGTSFF
hskcnq5 DA.....NKEFSTYADALWWGTITLTITIGYGDKTPLTWLGRLLSAGFALLGTSFF
hskcnq2 GE.....NDHFDYADALWWGLITLTITIGYGDKYPQTNWGRLLAATFTLICVSFF
hskcnq3 DVPEVDAQGEEMKEEFETADALWWGLITLTITIGYGDKTPKTWEGRLLAATFSLIGVSFF
hskcnq1 DAVNESGRV.....EFGSYADALWWGVVTVTTITIGYGDKVPQTNWCKTASCFSVFAT SFF

hskcnq4 ALPAGILGSGFALKVQEQHROKHFEKRRMPAANLIQAARLYSTDM SRA YLTATWYYYDS
hskcnq5 ALPAGILGSGFALKVQEQHROKHFEKRRNPAANLIQCVWRSYAAD.EKSVSIATW.....
hskcnq2 ALPAGILGSGFALKVQEQHROKHFEKRRNPAAGLIQSAWRFYATNLSRTDLHSTWQYYER
hskcnq3 ALPAGILGSGFALKVQEQHROKHFEKRRKPAAELIQAARWRYATNP NRIDL VATWRFYES
hskcnq1 ALPAGILGSGFALKVQEQKQROKHENRQIPAAASLIQTAWRCYAAENPDS...STWKIY..

hskcnq4 ..ILPSFRELALLFEHVQARNGGLRPLEVRRAPVPDGAPSRYP PVATCHRPGSTSFCPG
hskcnq5 ...KPHLKAL.....HT.....CSPTK.....KEQGEAS....
hskcnq2 TVTVPMYRLIPPLNQLELLRN LKSKSGLAFRKDP PPEPSP.....
hskcnq3 VVSFPFFR.....KEQLEAA....
hskcnq1 .....IRKAP..RSHTLLS.....PSPKPKKSVVVKKKFKL DKDNGVT

```





FIG. 6A

Human RNA Master Blot

TABLE 1

	1	2	3	4	5	6	7	8
A	whole brain	amygdala	Caudate nucleus	cerebellum	cerebral cortex	frontal lobe	hippocampus	medulla oblongata
B	occipital pole	putamen	substantia nigra	temporal lobe	thalamus	Subthalamic nucleus	spinal cord	
C	heart	aorta	Skeletal muscle	colon	bladder	uterus	prostate	stomach
D	testis	ovary	pancreas	pituitary gland	adrenal gland	thyroid gland	salivary gland	mammary gland
E	kidney	liver	small intestine	spleen	thymus	peripheral leukocyte	lymph node	bone marrow
F	Appendix	lung	trachea	placenta				
G	fetal brain	fetal heart	fetal kidney	fetal liver	fetal spleen	fetal thymus	fetal lung	
H	yeast total RNA	yeast tRNA	<i>E. coli</i> rRNA	<i>E. coli</i> DNA	Poly r(A)	human C <sub>0</sub> t DNA	human DNA	human DNA

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FIG. 6B

	1	2	3	4	5	6	7	8
A	•		•		•	•	•	
B	•	•		•				
C			•					
D								
E								
F								
G								
H				•				

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[illegible]

FIG. 7

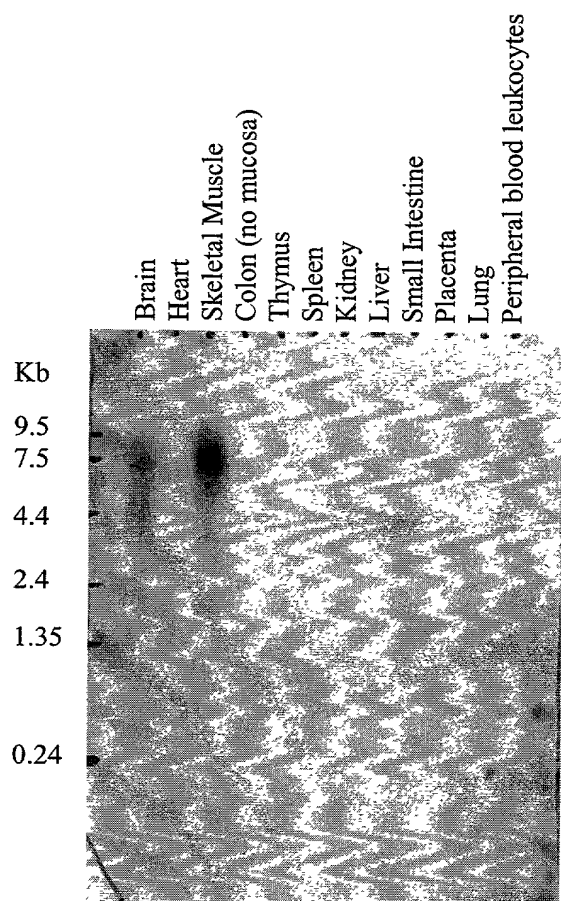
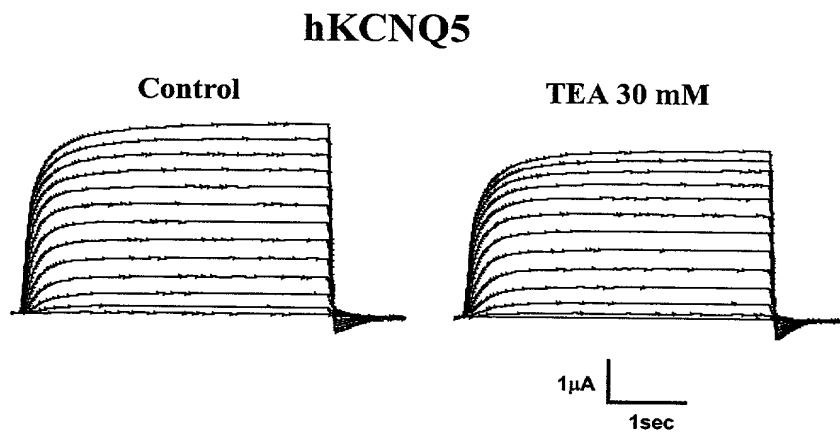


FIG. 8





Antisense

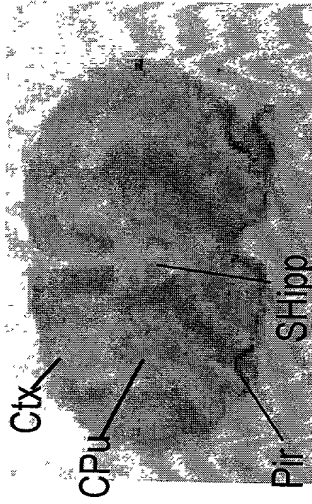


FIG. 9A

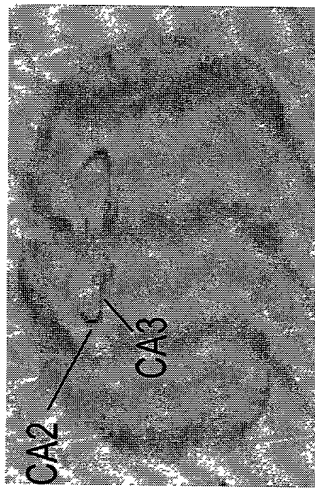


FIG. 9B

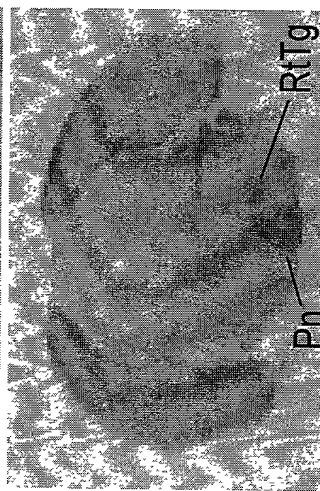


FIG. 9C

Sense



FIG. 9D

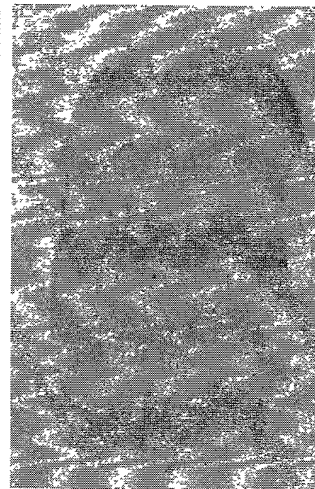


FIG. 9E

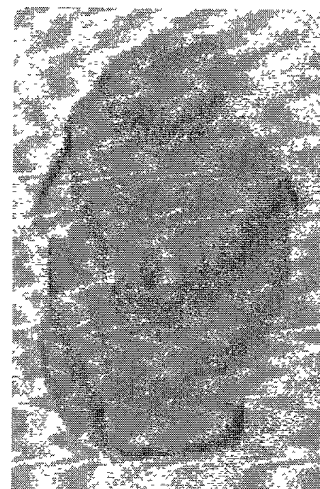


FIG. 9F

FIG. 10A

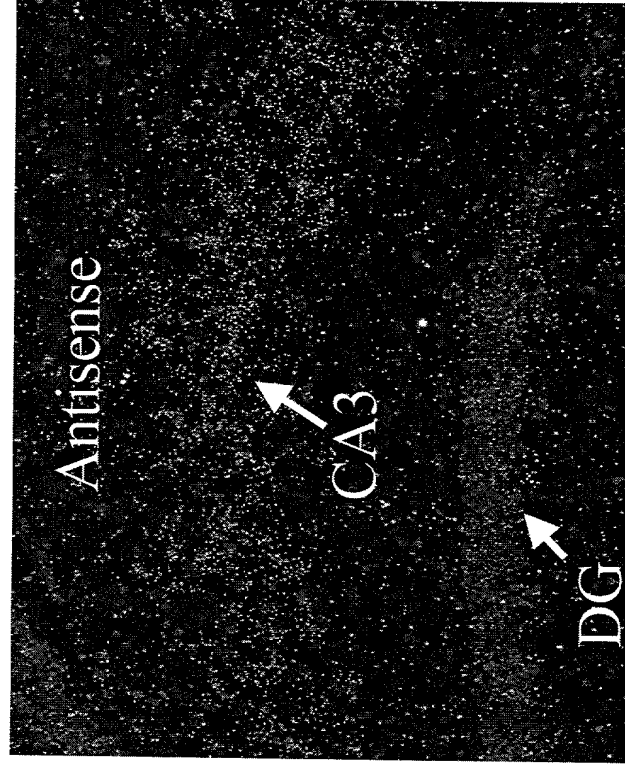


FIG. 10B

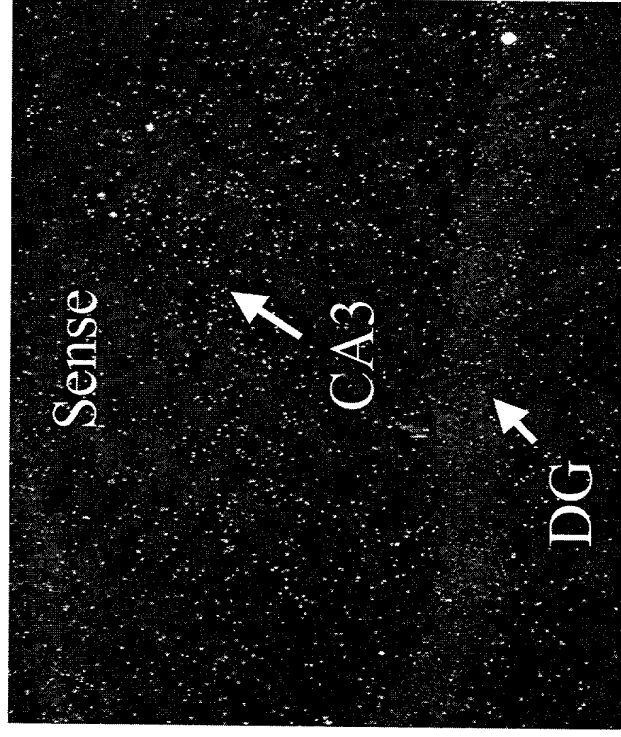


FIG. 11

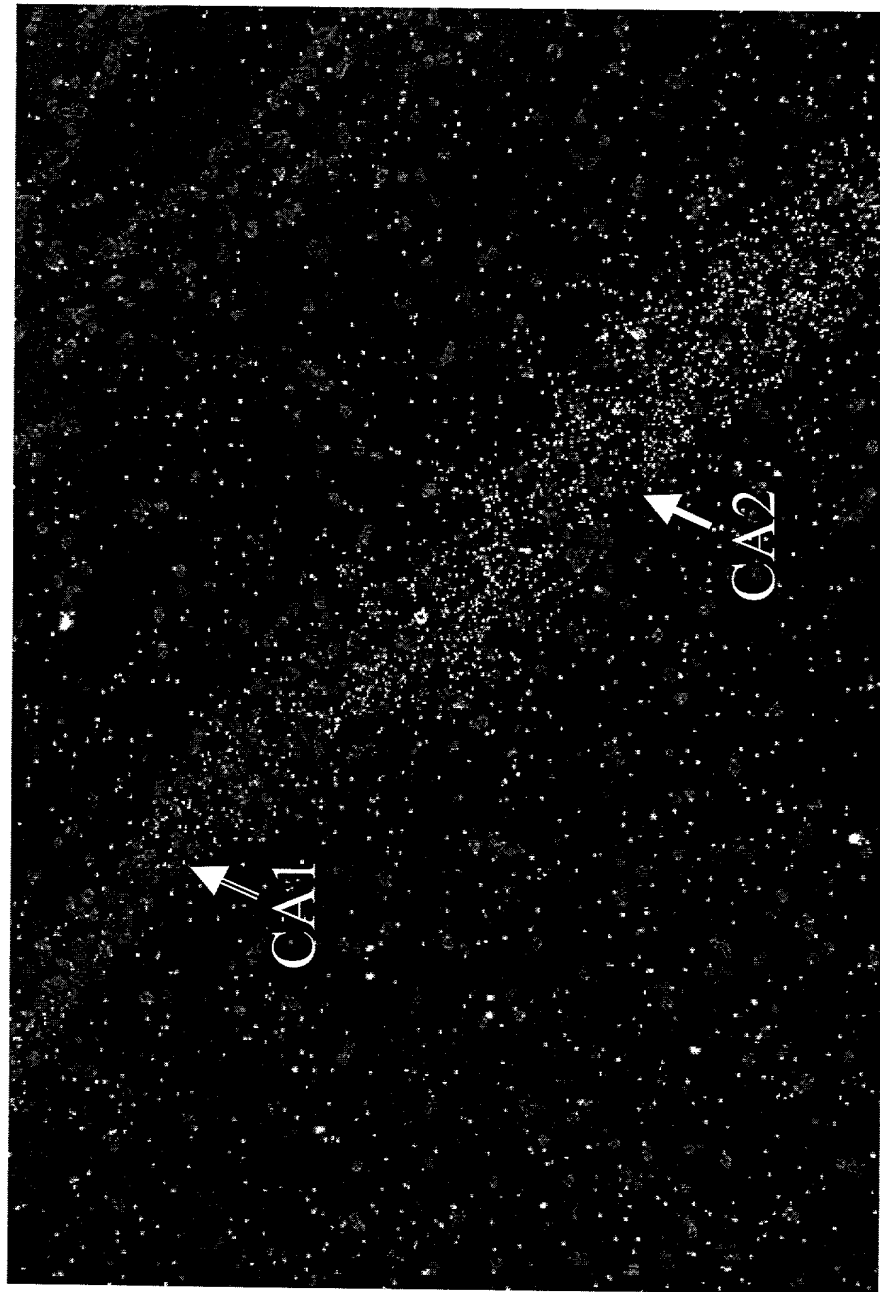


FIG. 12A

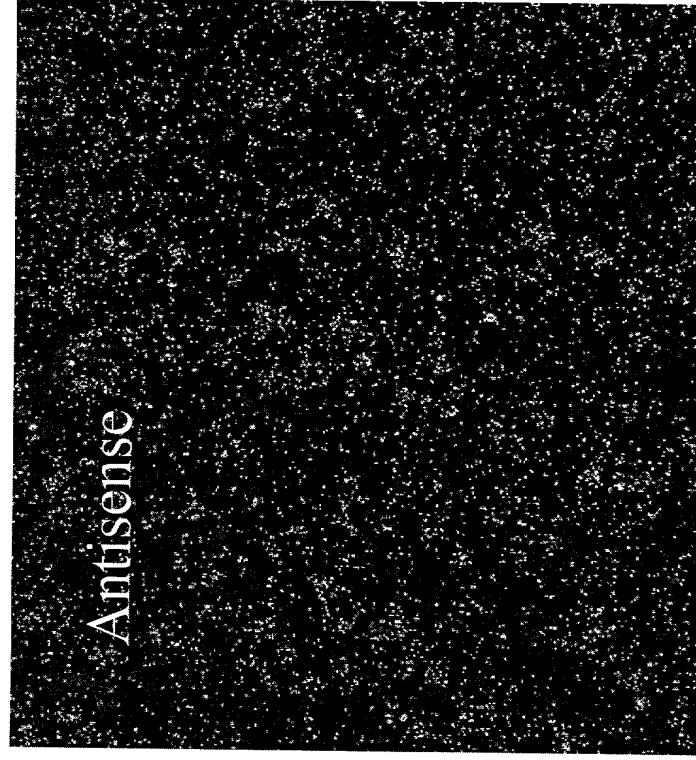


FIG. 12B

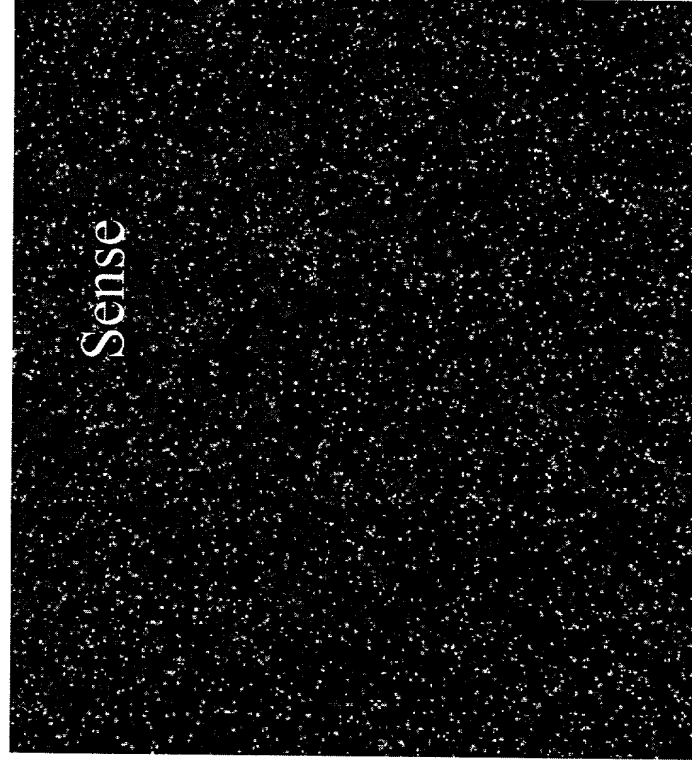


FIG. 13A

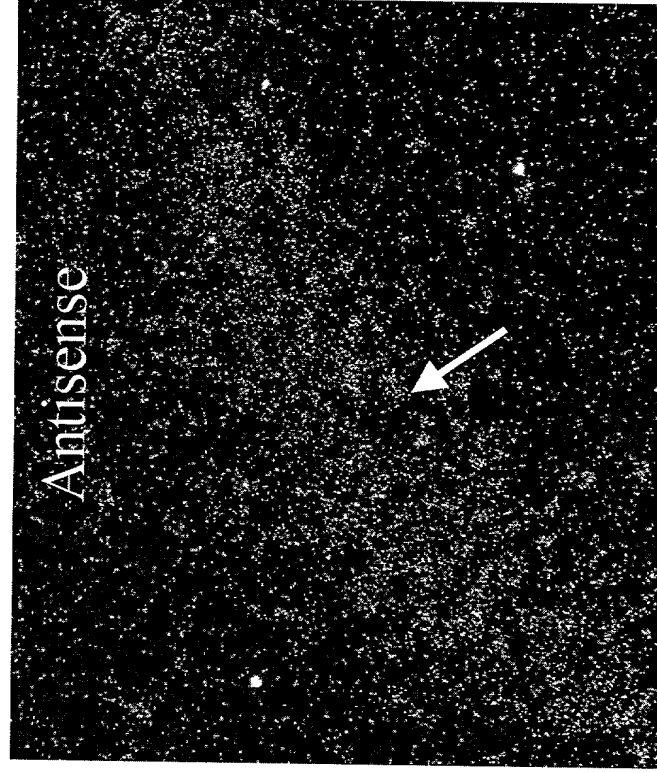


FIG. 13B

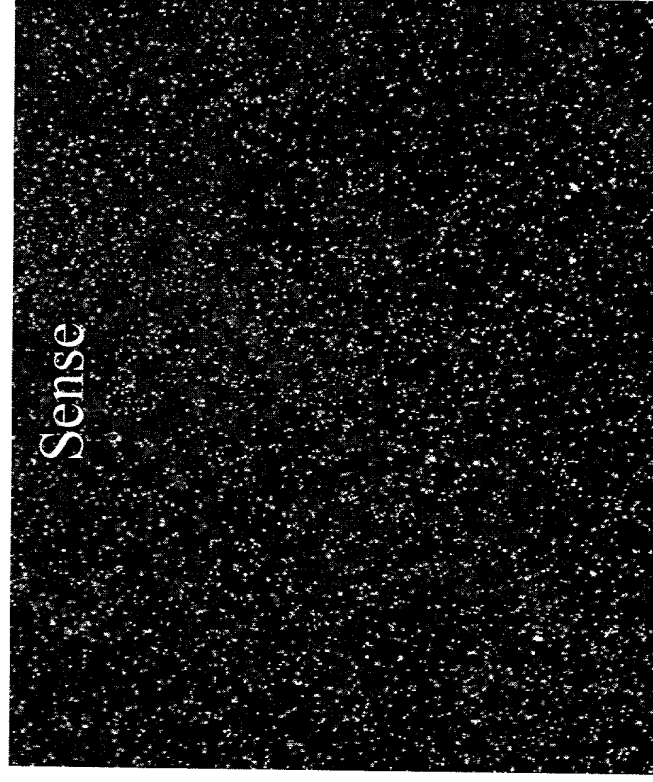


FIG. 14A

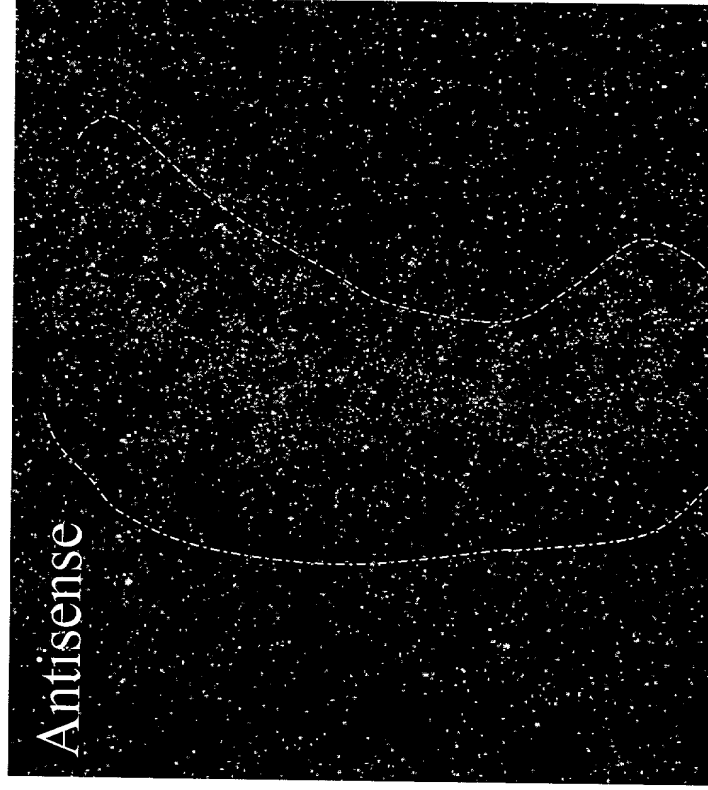


FIG. 14B

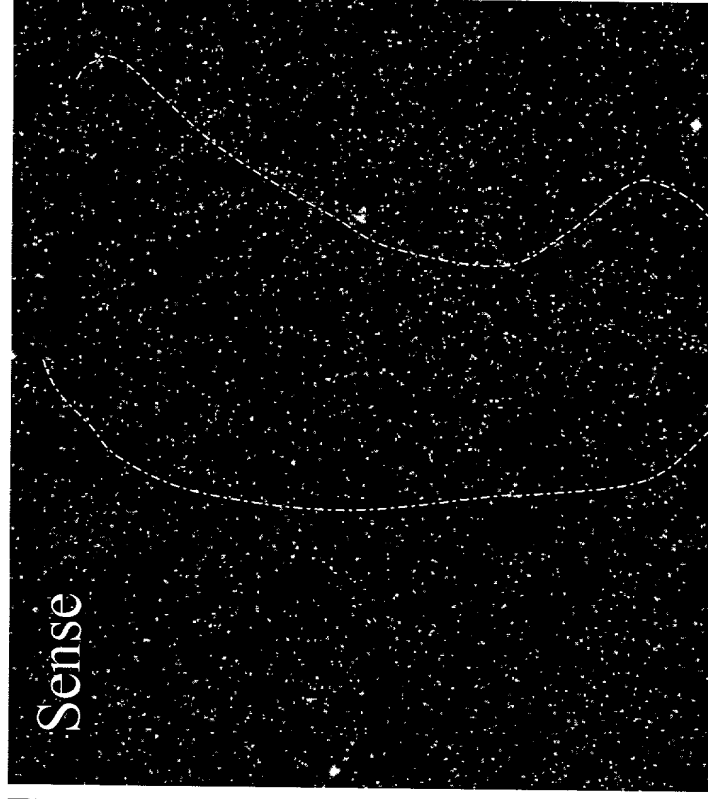


FIG. 15A

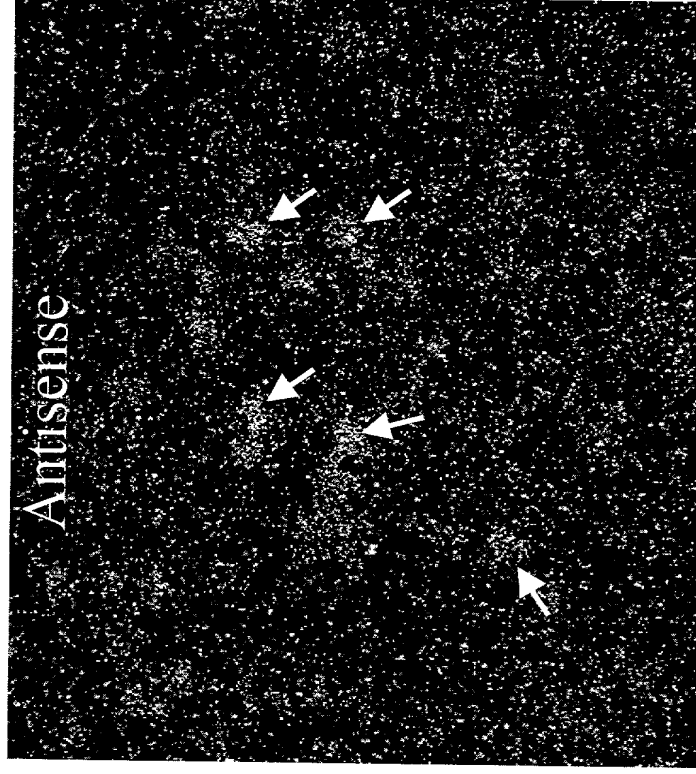


FIG. 15B

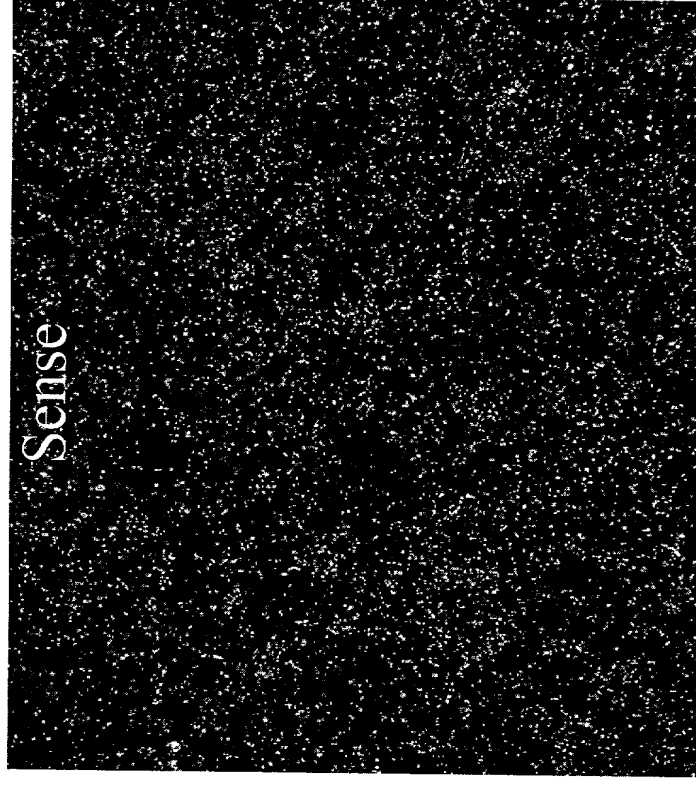


FIG. 16A

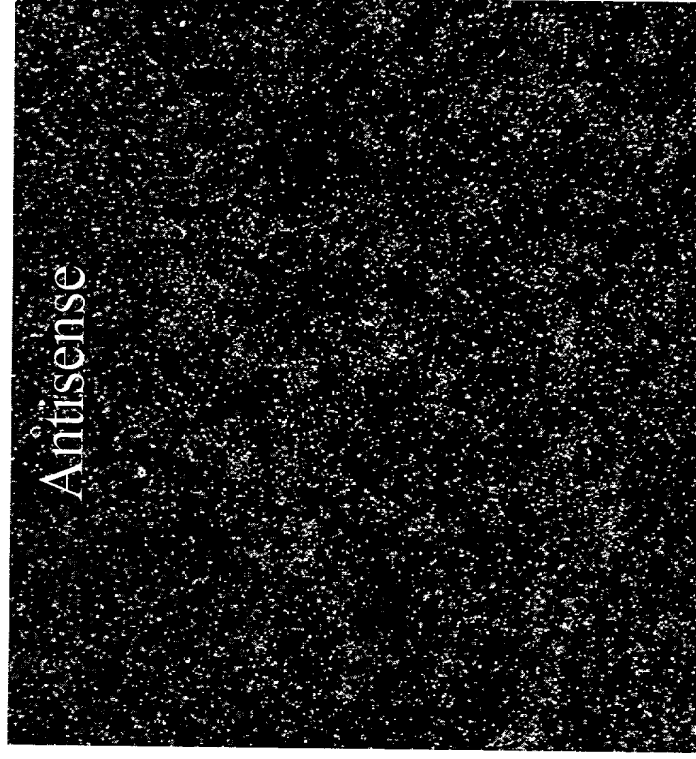


FIG. 16B

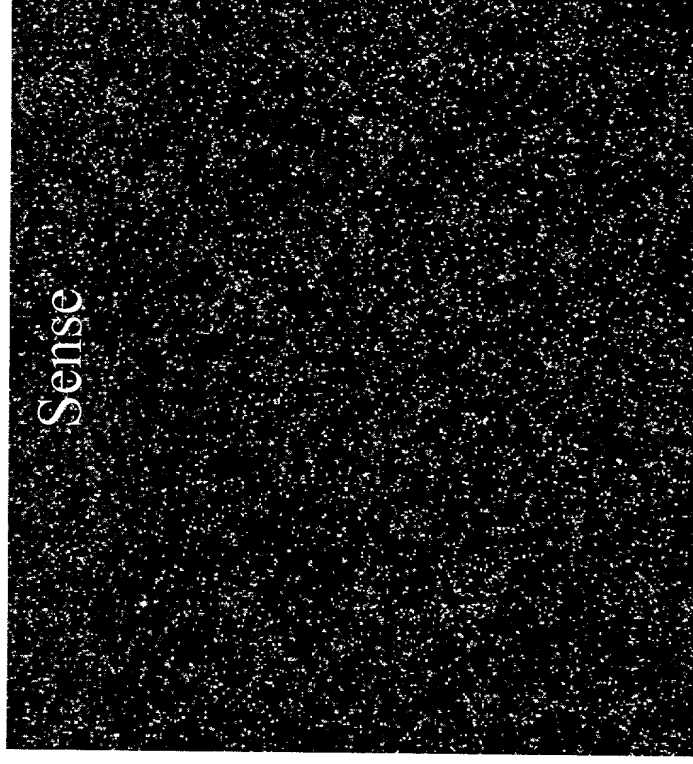




FIG. 17A

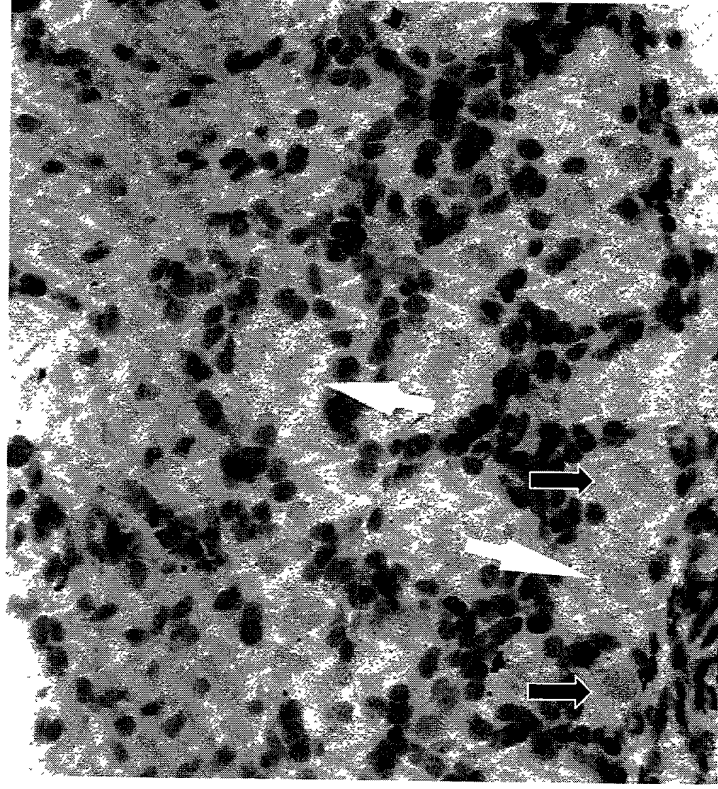
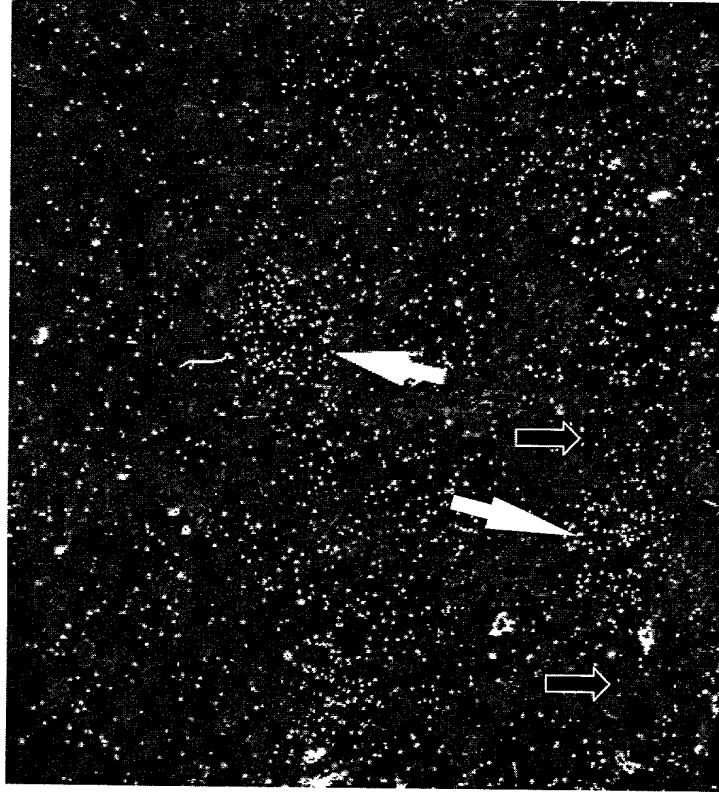


FIG. 17B



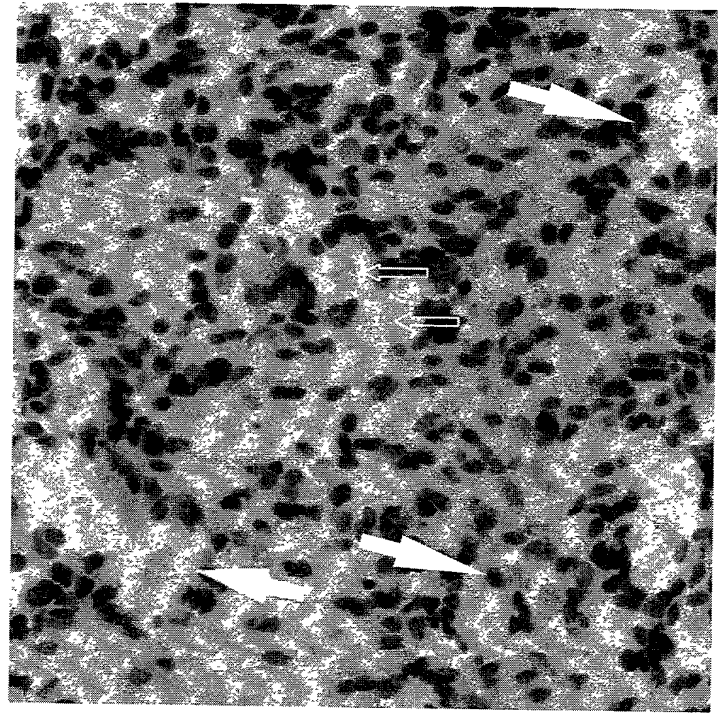


FIG. 18A

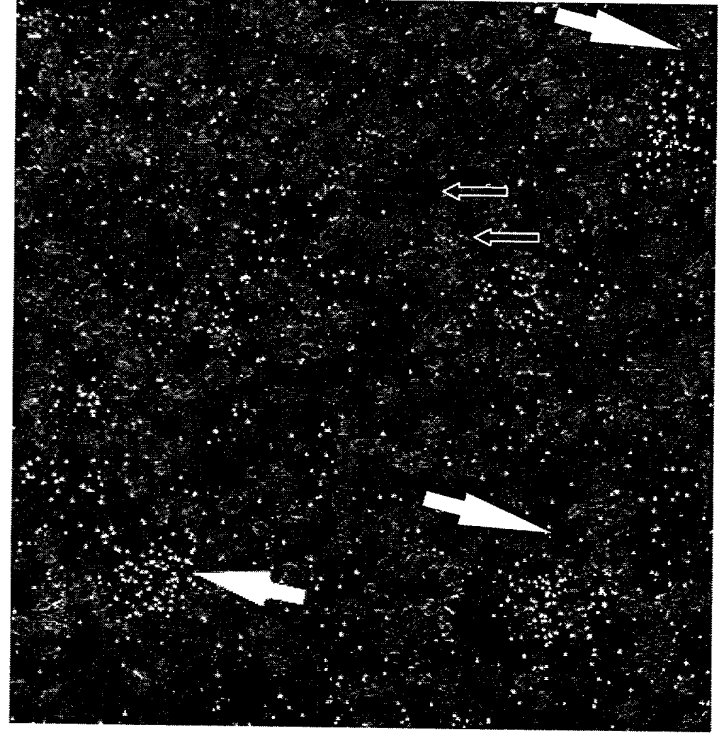


FIG. 18B